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## Assessing Spectrum Supportability

By Thomas Kidd - January-March 2010

The electromagnetic spectrum is a critical enabler of the Department of the Navy's ability to communicate and operate in a global environment. Now more than ever before, deployed Sailors and Marines depend on the electromagnetic spectrum because it enables nearly all Navy and Marine Corps capabilities, including strategic command and control; tactical communications (airborne and ground); intelligence, surveillance and reconnaissance; and radar, navigation and weapons systems.

Spectrum is also important to world commerce because it enables a vast array of wireless capabilities, including e-mail, mobile telephone, and other capabilities that are now essential to modern-day business and life. While spectrum is a finite natural resource, it is readily available in most rural areas of the world.

However, spectrum is congested in major metropolitan areas which include many coastal regions of the world. As a result, spectrum can be challenging to acquire in some geographical areas of the world and easily acquired for use in others.

The ability of Navy and Marine Corps forces to support diverse missions is critically dependent on the availability of spectrum. This availability is determined by a number of varying factors, including a host nation's allocation and control of spectrum within its borders, congestion, and operational requirements of spectrum-dependent equipment and systems.

Due to diverse and unique governance within many sovereign nations, spectrum-dependent systems and equipment procured for U.S. military use should be planned and designed for multiband operation or provide significant tuning flexibility to maximize global use.

Spectrum supportability is an assessment of whether the electromagnetic spectrum necessary to support the operation of spectrum-dependent equipment or systems will be available when required. While assessing the spectrum supportability for equipment does not constitute the right to operate the equipment, it can identify whether equipment can be supported with spectrum.

Spectrum supportability is composed of a number of processes. Obtaining permission to operate spectrum-dependent equipment may involve a lengthy, multi-step process that should be started as early as possible. It begins with a Spectrum Supportability Assessment (SSA) and includes considerable coordination and scrutiny. The box above contains guidance for ensuring spectrum supportability.

Department of Defense Instruction (DoDI) 4650.01, "Policy and Procedures for Management and Use of the Electromagnetic Spectrum," requires all DoD components to conduct spectrum supportability risk assessments as early as possible in the procurement of spectrum-dependent systems or equipment.

The purpose of the risk assessment is "to affect design and procurement decisions" because the early identification of regulatory, technical and operational spectrum supportability risks minimizes the possibility that the spectrum-dependent equipment cannot be employed to support Navy and Marine Corps requirements. Identified risks should be reviewed during acquisition milestones for programs of record and throughout a system's life cycle.

Within the DON, the responsibility for conducting a Spectrum Supportability Assessment resides with the organization procuring or acquiring the spectrum-dependent system or equipment. The composition and level of complexity for conducting a SSA is dependent upon a number of factors including the type of spectrum-dependent equipment and the intended operational area.

While it is necessary to assess the supportability of all spectrum equipment intended for procurement, some equipment requires only completion of the SSA. This would generally include equipment that complies with the "non-licensed" requirements identified in the National Telecommunications and Information Administration's (NTIA) "Manual of Regulations and Procedures for Federal Radio Frequency Management" and for equipment that will not be used outside of the United States and its possessions (US&P).

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Equipment of this type often includes wireless peripheral devices such as a wireless mouse or keyboard, wireless routers and Family Radio Service. Any spectrum-dependent equipment intended for use outside of the US&P, regardless of conformance with NTIA non-licensed requirements, is subject to DD Form 1494 – Application for Equipment Frequency Allocation requirements and applicable host nation requirements.

#### **DD Form 1494 – Application for Equipment Frequency Allocation**

The DD Form 1494 – Application for Equipment Frequency Allocation is used to record the technical characteristics of spectrum-dependent equipment and apply for host nation coordination and host nation allocation. The technical information documented on the form includes transmitter power, bandwidth and receiver sensitivity. It also includes other data that is essential for the employment of the equipment, HNC/HNA requirements, and frequency requests and assignments.

#### **Host Nation Coordination/Host Nation Approval**

In peacetime, international spectrum governance requires military forces to obtain host nation permission to operate spectrum-dependent systems and equipment within a sovereign nation. International governance is honored and enforced by the U.S. departments of State, Defense and Navy. In wartime, international spectrum governance is not honored between warring countries; however, the sovereign spectrum rights of bordering countries must be respected by military forces executing their assigned missions.

Accordingly, HNA is solicited by U.S. naval forces to use spectrum-dependent systems and equipment in bordering countries' airspace and/or on bordering countries' soil. HNA must be obtained before the operation of spectrum-dependent systems and equipment within a sovereign nation. The combatant commander is responsible for coordinating requests with sovereign nations within his or her area of responsibility. Because the combatant commander has no authority over a sovereign nation, the HNC/HNA process can be lengthy.

#### **U.S. Equipment Certification**

Equipment certification is a U.S. HNC/HNA process. The NTIA coordinates and reviews equipment certification requests with the agencies of the federal government. U.S. equipment certification ensures that the radio frequencies required for the operation of the equipment can be made available within the United States. It also ensures that equipment that cannot be supported with a radio frequency is not purchased.

#### **Electromagnetic Environmental Effects**

The joint definition of electromagnetic environmental effects (E3) is: "the impact of the electromagnetic environment upon the operational capability of military forces, equipment, systems, and platforms. It encompasses all electromagnetic disciplines, including electromagnetic compatibility and electromagnetic interference; electromagnetic vulnerability; electromagnetic pulse; electronic protection; hazards of electromagnetic radiation to personnel, ordnance and volatile materials; and [the] natural phenomena effects of lightning and precipitation static."

Before the acquisition of spectrum-dependent equipment, possible impacts of electromagnetic compatibility (EMC) and electromagnetic interference (EMI) should be considered to ensure the equipment can be employed in its intended operational environment.

In accordance with DoD Directive 3222.3, "DoD Electromagnetic Environmental Effects (E3) Program," "Identification of requirements for E3 control shall be initiated early during the concept refinement and technology development phases, fully defined prior to Milestone C, and verified throughout the acquisition process."

#### **Frequency Request and Assignment**

A frequency assignment provides authorization for operation of a spectrum-dependent system or equipment under specific requirements and generally applies to a specific geographical area. Frequency assignments must be requested before the operation of systems and equipment and authorized by a proper authority for a given geographical area.

Within the US&P, frequency assignments for use by federal agencies, including the DON, are authorized by the NTIA. Navy and Marine Corps requests for frequency assignments are coordinated with the NTIA under the authority of the DON Chief Information Officer. Outside the US&P, regional combatant commanders authorize and assign frequencies within their area of responsibility; a sovereign host nation is the ultimate authority for use of radio frequencies within its boundaries.

Ensuring spectrum supportability for Navy and Marine Corps equipment and systems is often a complex task in light of global requirements. But despite the enormity of the challenge, the DON maintains a fully capable team of experts to assist and process applicable spectrum supportability requirements.

In addition to the Spectrum Supportability Assessment, spectrum supportability may include the completion of:

- DD Form 1494 – Application for Equipment Frequency Allocation
- U.S. Equipment Certification
- Electromagnetic Environmental Effects (E3) Assessment
- Host Nation Coordination/Approval (HNC/HNA)

• Request for Spectrum Supportability Assessment

- Frequency request/assignment
- Spectrum Supportability Assessment

The Department of the Navy has established spectrum policy that aligns with international, national and DoD spectrum governance to attain access for all spectrum requirements of the Navy and Marine Corps.

- Secretary of the Navy (SECNAV) Instruction 2400.1, "Electromagnetic Spectrum Policy and Management," provides DON spectrum policy and delegates spectrum responsibilities within the department (available at [www.doncio.navy.mil](http://www.doncio.navy.mil)).
- SECNAVINST 5000.2D, "Implementation and Operation of the Defense Acquisition System and the Joint Capabilities Integration and Development System," identifies DON specific requirements associated with the acquisition of spectrum-dependent equipment (available at <http://doni.daps.dla.mil>).
- OPNAVINST 2400.20F, "Electromagnetic Environmental Effects (E3) and Spectrum Supportability Policy and Procedures," provides service-level policy for the Navy while Marine Corps Order 2400.2A, "Marine Corps Management and Use of the Electromagnetic Spectrum," provides Marine Corps spectrum policy (available at <http://www.marines.mil/news/publications> – search on "electromagnetic spectrum").

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